



NEBRASKA AGRICULTURE TABLE OF CONTENTS

A New Beginning Background on Nebraska Agriculture	5
Discovering Nebraska Agriculture	
Overview of Nebraska geography, weather, and irrigation	6
TheIndustry	11
Beef	12
Pork	13
Sheep & Goats	14
Poultry & Eggs	15
Dairy	
Corn	
Soybean	18
Wheat	
Grain Sorghum	20
Dry Edible Beans	
Alfalfa & Hay	
Potatoes	
Sugar Beets	
Popcorn	
Grapes & Wine	
Fruits & Vegetables	
Honey	
Christmas Trees	
The Importance of Agriculture	30



On the cover is the Brian and Hilary Maricle family. The Maricles raise beef cattle, corn, soybeans and hogs.

Photo Courtesy of Journal Communications Inc.

Nebraska Agriculture

Fact Card

A cooperative effort of the Nebraska Department of Agriculture USDA, NASS, Nebraska Field Office Nebraska Bankers Association Nebraska AgRelations Council February 2013

Nebraska's Top National Rankings

- 1st Commercial red meat production, 2012 7,284,000,000 lbs.
 Commercial cattle slaughter, 2012 6,730,400 head
 Commercial cattle slaughter, 2012, live weight –
 9,163,177,000 lbs.
 Great Northern beans production, 2012 1,087,000 cwt.
 Irrigated land harvested, 2007 8,558,559 acres
 Popcorn production, 2007 294,541,958 lbs.
- 2nd All cattle and calves, Jan. 1, 2013 6,300,000 head All cattle on feed, Jan. 1, 2013 2,550,000 head Pinto beans production, 2012 1,833,000 cwt. Beef and veal exports \$742,000,000
- 3rd Corn for grain production, 2012 1,292,200,000 bushels Net farm income, 2011 \$7,456,742,000
 All dry edible beans production, 2012 3,193,000 cwt.
 Proso millet production, 2012 660,000 bushels
 Corn Exports \$1,639,400,000
- 4th Cash receipts from all farm commodities, 2011 \$21,814,979,000
 Cash receipts from all crops, 2011 \$11,754,013,000
 Cash receipts from all livestock and products, 2011 \$10,060,966,000
 Land in farms and ranches, 2011 45,500,000 acres
 On-farm grain storage capacity, Dec. 1, 2012 1,110,000,000 bushels
 Off-farm commercial grain storage capacity, Dec. 1, 2012 863,470,000 bushels
 Soybean Exports \$1,434,900,000
- 5th Agricultural exports, 2011 \$6,930,000,000 Soybean production, 2012 – 207,085,000 bushels
- 6th Harvested acres of principal crops, 2012 18,896,000 acres All hogs and pigs on farms, Dec. 1, 2012 – 3,000,000 head
- 7th Commercial hog slaughter, 2012 7,889,100 head Commercial hog slaughter, 2012, live weight 2,154,890,000 lbs. (977,441,662 kg)
- 8th Grain sorghum production, 2012 3,540,000 bushels Alfalfa hay production, 2012 2,272,000 tons
- 9th Winter wheat production, 2012 53,300,000 bushels
 Table egg layers (flocks of 30,000+), Dec. 2012 9,246,000 layers
- 10th All hay production, 2012 4,072,000 tons

Nebraska Ag Facts

- Cash receipts from farm marketings contributed over \$21 billion to Nebraska's economy in 2011 and 5.8 percent of the U.S. total.
- Nebraska's ten leading commodities (in order of importance) for 2011 cash receipts are cattle and calves, corn, soybeans, hogs, wheat, dairy products, chicken eggs, hay, sugar beets, and dry beans, which represent 98 percent of the state's total cash receipts.
- Every dollar in agricultural exports generates \$1.34 in economic activities such as transportation, financing, warehousing, and production. Nebraska's \$6.9 billion in agricultural exports in 2011 translate into \$9.3 billion in additional economic activity. Nebraska's top five agricultural exports were corn, soybeans, other products, grain products, and hides and skins.
- Nebraska had 46,800 farms and ranches during 2011; the average operation consisted of 972 acres (393 ha); average net income per farm averaged \$92,208 during the 2007-2011 period.
- □ In 2012, Nebraska ranked second in ethanol production capacity, with 25 operating plants having production capacity of 2.25 billion gallons (851,717,651 dal). Over 40% of the State's 2011 corn crop was utilized in ethanol production.
- ☐ Livestock or poultry operations were found on 50% of Nebraska farms
- ☐ The top five counties ranked by agricultural sales in 2007 were Cuming, Dawson, Custer, Phelps, and Lincoln.
- In 2008, Nebraska was eighth nationally in certified organic cropland acres (129,858) and eighth in certified organic pasture acres (53,174)

Nebraska's Natural Resources

- Nebraska's farms and ranches utilize 45.5 million acres –
 93% of the state's total land area.
- Nebraska is fortunate to have aquifers below it. If poured over the surface of the state, the water in those aquifers would have a depth of 37.9 feet. The state has 93,557 registered, active irrigation wells supplying water to over 8.5 million acres of harvested cropland and pasture. Of the total cropland harvested during 2007, 46 percent was irrigated.
- Nearly 24,000 miles of rivers and streams add to Nebraska's bountiful natural resources.
- ☐ There are nearly 23 million acres (9,307,806 ha) of rangeland and pastureland in Nebraska half of which are in the Sandhills.

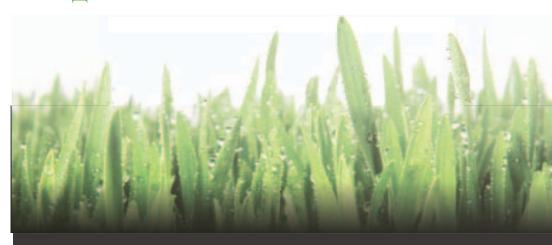
Source: USDA ERS and USDA NASS, Nebraska Field Office (More detailed list of rankings available from USDA NASS, Nebraska Field Office (Phone (402) 437-5541)

A NEW BEGINNING



NEBRASKA AG

NEBRASKA TERRITORY The vast, nearly treeless expanse of grass was all that welcomed the first pioneers who traveled west for new land. Those first settlers came to carve a new way of life, just as their plows carved up the thick sod for their shelter and crops.

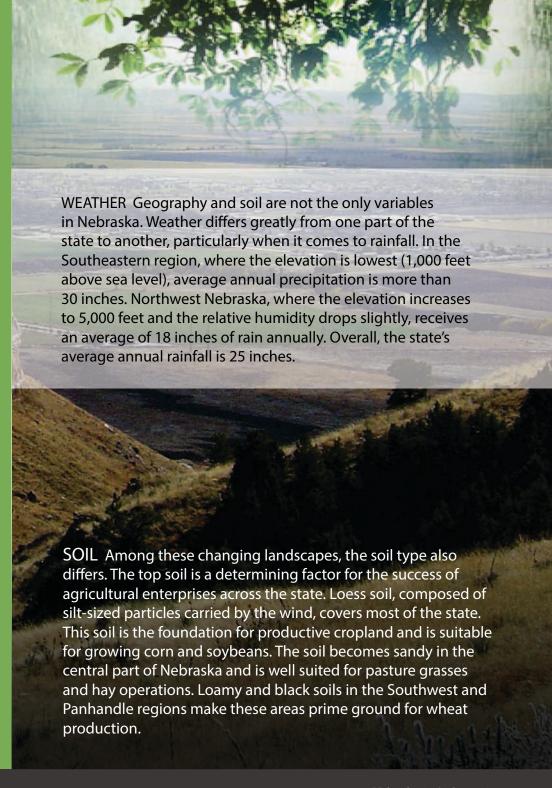


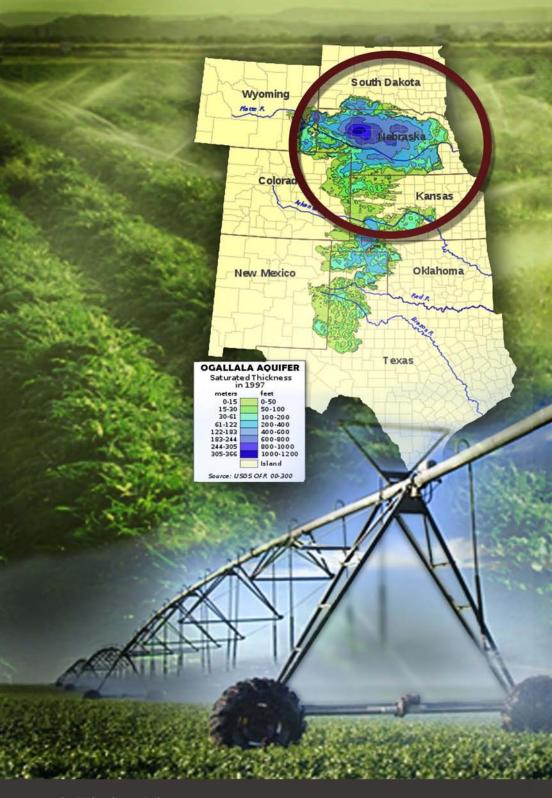
DISCOVERING NEBRASKA AGRICULTURE

Once known as the "Great American Desert," Nebraska has evolved into a rich agricultural resource with more than \$21 billion in cash receipts annually. Ninety-three percent of the state's land is in production agriculture and supports a wide variety of enterprises. There are approximately 46,800 farms and ranches across the state. From small fruit and vegetable farms, to cattle ranches stretching across thousands of acres, Nebraska is home to the producers who feed the world.



GEOGRAPHY Located in the center of the United States, Nebraska is quite diverse in geography. A drive across the state from east to west unveils a variety of landscapes: picturesque rolling hills, fertile valleys, expansive plains, and the awe-inspiring Sandhills.







IRRIGATION Another important and very valuable natural resource for Nebraska agriculture is a massive groundwater reservoir, primarily known as the Ogallala Aquifer. Located mainly underneath the entire Central and West Central regions of the state, it lies below nearly two-thirds of Nebraska and provides a dependable source of irrigation water.

Irrigation makes it possible to grow crops in areas once considered too dry to sustain plants other than range vegetation. Nebraska's vast network of rivers, streams, and waterways enables farmers to channel water to drier areas using ditch irrigation. Center pivot sprinkler systems and gravity pipe irrigation tap into groundwater resources. Approximately 8.5 million acres of Nebraska crop and pastureland are irrigated.



Nebraska is a diverse agricultural state with bountiful natural resources and farmers and ranchers who are excellent stewards of the land. Agricultural production will remain a strong piece of the economic backbone in Nebraska and an important contributor to feeding and fueling our nation and the world.

This background on the resources which make Nebraska a leading agriculture producer is a good foundation for learning more about the numerous products grown and raised on the state's farms and ranches. The following pages further tell the story of this prominent industry. Along with the description of each commodity is an outline of the state. The green shading illustrates the area most suited for that particular crop or livestock species.



THE NEBRASKA AGRICULTURE INDUSTRY

BEEF

As the largest agricultural sector in Nebraska, most of the state's cattle are raised by cow/calf operations and cattle-finishing feedlots. Cow/calf operations range in size from 20 head to more than 1,000 head. Nebraska easily supports this industry segment with more than 20 million acres of pastureland and an abundant supply of feed. Feedlots also vary greatly in size. The average market steer fed to 1,300 pounds yields more than half of its weight in beef. Most of the remaining weight is recovered as edible and non-edible by-products, such as medical research and training, leather upholstery, fishing line, biodegradable outboard motor oil, and even pet chew toys and gummy candies.



DID YOU KNOW ...?

- Grain-fed Nebraska beef is known worldwide for its flavor and quality.
- The cattle industry in Nebraska generates approximately \$7.2 billion in cash receipts yearly.
- Cattle outnumber people in Nebraska, with nearly 6.3 million

head of cattle on farms and feedlots and only 1.8 million residents.

 Nebraska has the top three beef cow counties in the U.S., including the nation's number 1 cow county, Cherry County.



PORK

Nebraska's pork industry plays a major role in the state's agricultural economy. Hog operations are of a variety of sizes and production systems and combined have more than 3 million head. Advances in animal genetics, technology, and management practices have changed production, leading to leaner, more nutritious pork products that have an average of 31 percent less fat, 17 percent fewer calories, and 10 percent less cholesterol than the pork produced 10 years ago.



- Nebraska's pork industry generates approximately \$775 million in cash receipts yearly.
- There are nearly 35,000 full-time pork producing jobs, which help generate an additional 515,200 indirect jobs, such as trucking, processing, etc.
- Six Nebraska counties rank in America's top 100 hog producing counties.
- Nebraska ranks sixth in the nation's pork producing states.
- Pork is the most widely consumed meat in the world with 46.6 percent of the population eating pork products.



SHEEP & GOATS

Nebraska's sheep and goat herds provide a source of both food and fiber. Meat from sheep, called lamb or mutton, is high in protein. Consumption is typically greater in the larger population centers, especially on the east and west coasts. Goat meat, or chevon, is a staple in some foreign countries and a delicacy in

others. Both lamb and chevon are common ingredients in many ethnic dishes. Sheep also are known for their wool production, while angora goats are known for their mohair production. Nebraska is also home to goats and sheep bred specifically for milking purposes. Milk is consumed and used in specialty soaps



and lotions

DID YOU KNOW ...?

- Nebraska is 19th in the nation for total number of sheep and lambs with 80,000 animals.
- Nebraska is home to 17,000 meat goats and 2,800 dairy goats.
- Over 400,000 pounds of wool is produced each year in Nebraska.
- One sheep will produce eight pounds of wool each year. That is enough to make a three piece suit.







POULTRY & EGGS •

Most of the poultry raised in Nebraska are laying hens that play an important role in supplying eggs for further processing by egg companies in our state. Processed eggs are used for commercial, food service, and home use, including refrigerated liquid, frozen, dried, and specialty products. They are comparable to shell eggs in flavor, nutritional value, and most functional properties.



 More than 9 million birds populate Nebraska's commercial laying facilities and produce more than
 2.7 billion eggs each year.

Nebraska ranks 12th nationally in egg production.

 Nebraska is a leading state nationally in the production of further processed egg products.

 A small number of commercial turkey producers raise birds that are exported to lowa and Minnesota for processing.





Virtually all of Nebraska's dairy farms are family owned or operated. Dairy farmers work to ensure the health of their cows and the environment by being good stewards of the land. For example, many producers recycle sand used for bedding and water used for cleaning barns. Composting is also a common practice on many dairy operations. Many dairy farms employ staff members and create jobs in transportation, processing, and retail industries. The dairy items produced on Nebraska farms are sent to several dairy processing plants located within the state to provide fresh, quality products.



DID YOU KNOW ...?

- Nebraska ranks 26th nationally in total milk production.
- Dairy production accounts for \$200 million of Nebraska's agricultural receipts.
- The majority of dairy farms are located in the central and eastern parts of the state.
- Milk and milk products are some of the most highly tested and regulated foods produced in America.
- Approximately 200 licensed producers look after 55,000 dairy cows statewide.





The "Cornhusker State" prides itself on its corn production. This crop is the most widely grown crop in Nebraska and has a variety of uses, from feeding livestock and poultry, to creating ethanol fuel and even bioplastics. No state is better suited to take advantage of the combination of corn, ethanol, distillers' grains, and cattle than Nebraska.



There are 23,000 corn farmers across the state, producing six times more corn than in the 1920s.

In 2012, 9.1 million acres were utilized for corn production in Nebraska.

More than 1.2 billion bushels were harvested in 2012, making Nebraska the third largest corn producing state in the nation.

Today's corn farmers grow 87 percent more corn per ounce of fertilizer than they did 30 years ago and have cut erosion by 44 percent through new tillage practices.

Nebraska is home to 25 operating ethanol plants that use corn to produce more than 1.2 billion gallons of ethanol each year, making Nebraska the second largest ethanol producing state in the nation.



The "soya bean" is one of the oldest forms of nutrition in the world and is used in livestock, fish, and poultry feeds, as well as many food items available for human consumption. Some of its uses include items such as soy ink, biodiesel fuel, biodegradable plastic, and cooking oil. It is widely grown in Nebraska, usually in rotation with corn.



DID YOU KNOW ...?

- Nebraska is the fifth largest soybean producing state with more than 245 million bushels produced annually.
- Soybeans generate more than \$2 billion annually, making them the second leading crop in Nebraska.
- Soybeans are considered the world's foremost provider of vegetable proteins for humans.



 One bushel of soybeans yields about 11 pounds of low-fat, zero-cholesterol soybean oil.



Nebraska produces two types of wheat: hard red winter and hard white winter wheat. While providing all of the nutritional value and health benefits of whole grains, hard white wheat offers the look, texture and taste of enriched flour. It's popular in the same products as hard red winter wheat as well as Asian noodles and Middle Eastern flat breads.

Hard red winter wheat is very versatile, with excellent milling and baking characteristics for pan breads and yeast raised flour foods. This type of wheat also is commonly used as



- Nebraska is the 12th largest wheat producer in the United States.
- Nebraska has approximately 1.5 million acres in wheat production.
- In 2011, Nebraska's wheat production was valued at more than \$437 million.
- Hard red winter wheat is the main source of flour for loaf bread, hamburger buns, and other foods.
- Each year, Nebraska harvests between 55 and 65 million bushels of wheat. The average bushel of wheat weighs 60 pounds and can make 64 loaves of bread.
- Nebraska is one of nine states producing hard white winter wheat.
- As much as 50 percent of Nebraska's wheat is annually exported to international markets.



GRAIN SORGHUM •

Grain sorghum, also known as milo, is one of the four primary grain crops grown in Nebraska and is widely used in animal and poultry feed. Sorghum is also well suited for human consumption. All sorghum varieties are gluten-free and provide an alternative to those who suffer wheat allergies. Nebraska farmers plant an average of 150,000 acres of sorghum annually. It can grow well in regions with little precipitation because of its water use efficiency and high-drought tolerance. Warm, dry summers in South Central Nebraska support this predominately dryland crop. Sorghum is also common in Southeastern Nebraska.



DID YOU KNOW ...?

- Nebraska ranks eighth in the nation in grain sorghum, with more than 5 million bushels produced annually.
- Sorghum is chemically similar to the starch content in corn. Ethanol can be made from sorghum.
- Sorghum flour and other whole-grain products are commercially available.
- A healthy export market for high-quality feed grains keeps sorghum in demand around the world, primarily in Japan and Mexico.
- Mature sorghum ranges in color from deep bronze to pearly white.





DRY EDIBLE BEANS -

Dry edible beans are predominately grown in western Nebraska. Dry edible bean plants are cut close to the ground in the early morning while they're covered with dew. The whole plant is allowed to dry in windrows before being combined. The combining process breaks the pods open and separates the dry edible beans from the plant material. After harvest, the beans are taken to local processors where they are

graded, sorted and cleaned for shipping to canners, grocery stores, or overseas markets.



- Several varieties are grown in Nebraska including: Great Northern beans, Pinto beans, Black beans, Light Red Kidney beans, Navy beans, Pink beans, and Garbanzo beans.
- Nebraska annually harvests 125,000 acres of dry edible beans for a total production of more than 2 million hundred-weight bags.
- Nebraska ranks first in the nation in Great Northern bean production, second in the nation for Pinto bean production, and third in the nation for all dry edible bean production.
- Dry edible beans are so nutritious that the USDA recognizes them as the lowest cost source of protein available.





ALFALFA & HAY

Alfalfa and grass hay are produced in every county in Nebraska, totaling about two to three million acres. The products' contribution to the livestock industry's production of red meat and milk ranks them high in the major cash crops. Much of the alfalfa and hay not fed directly to the producer's livestock is sold to others who don't raise enough for their own needs or is sold outside Nebraska to support livestock in hay deficient areas.





DID YOU KNOW ...?

- Alfalfa and hay production in 2012 was more than 4 million tons.
- Nebraska's centralized location makes it an excellent supplier for the alfalfa and hay needs of livestock producers from other states.
- Alfalfa is a valuable source of protein and energy, as well as quality roughage for all classes of livestock.
- The price that producers receive for their hay is determined by the quality, storage method,

and size of the bale.

 Nebraska produces dehydrated alfalfa pellets, which can be economically exported to other states and countries.



POTATOES

Nebraska's water resources, sandy soils, and favorable climate promote great potato yields. Nebraska's central location in the United States also is a marketing advantage. Potato planting in Eastern Nebraska begins in early April for a summer harvest, while Central and Western areas plant in early May for a fall crop. Unlike most other crops, potatoes are stored and marketed directly by the producers, creating a year-round job.



- Nebraska is 11th in the nation for potato production, with more than 10.1 million potatoes grown in 2012.
- The carbohydrates, vitamins, and minerals found in potatoes make them an important component of a well- balanced diet.
- About one-third of the states' potatoes are processed into potato chips. The rest of Nebraska's potatoes are table potatoes for grocery stores and seed potatoes.



Nebraska Agriculture



SUGAR BEETS

Sugar beets have been successfully produced in Nebraska for over 100 years. Nebraska-grown sugar beets are a major contributor to the United States sweetener industry and are found in a wide range of food products with some byproducts going into livestock feed.

The crop needs a long growing season, generally April to October, and days with abundant sunshine followed by cool evenings to facilitate the storing of sugar in the crop's roots.

Approximately 90% of the sugar beets grown



in the state are produced in the Panhandle.

DID YOU KNOW ...?

- Nebraska generally ranks 5th in the nation for production of sugar beets and averages 50,000 acres planted annually.
- Of the current world production of more than 130 million metric tons of sugar, about 55 percent comes from sugar beets and 45 percent from sugar cane.
- Sugar beets are an important crop economically and are estimated to contribute more than \$130 million to the local economy through payrolls, property taxes, and other impacts.





The production process for popcorn is very similar to that of field corn and to most people, a corn plant and a popcorn plant will look very similar. Yields from one acre of popcorn range from 50 to 100 bushels. These numbers vary, depending on production techniques and the use of irrigation. Some of the un-popped corn is packaged for local distribution, while the rest is exported in bulk shipments to other states and countries.



- Nebraska ranks first in popcorn production in the United States with nearly 300 million pounds produced annually.
- Popcorn is a nutritious and low-calorie snack.
 Primarily a carbohydrate, popcorn contains a number of nutrients and is a great energy source.
- There are a number of varieties of popcorn, each with its own taste and texture.

GRAPES & WINE

Nebraska grown grapes are produced into fine wines. Nebraska has 25 wineries and 8 tasting rooms located across the state. Grape and wine production gained momentum in the 1990s and has continued to grow the past 20 years. Nebraska's fertile soils, topography, and humid continental and semiarid climates have been conducive to producing premium quality grapes that have resulted in award-winning wines.



DID YOU KNOW ...?

- Nebraska grows many French-American hybrids and American varietals.
- Winter hardy grape varieties, among the reds, include Frontenac,
 Marechal Foch, and de Chaunac and, among the whites, Brianna,
 Edelweiss, LaCrosse, and Traminett.
- Nebraska has 126,159 vines, 338 acres of vines, and 114 grape growers.
- Over 88,000 gallons of Nebraska wine is produced each year.





Fruit and vegetable production is steadily growing in Nebraska. While some areas may be more productive than others, production can be found throughout the state to varying degrees. This includes standard vegetables, such as tomatoes and cucumbers, to melons, pumpkins, squash, onions, berries, sweet corn, and many other types of produce. This highly intensive enterprise requires specialized

equipment, a large labor supply, and the knowledge needed to produce and market a profitable crop.







- Many fruit and vegetable farms diversify their marketing efforts by selling at farmers' markets, roadside stands, U-pick operations and/or through wholesale and/or retail outlets.
- The number of Nebraska produce growers has increased 700 percent over the past decade from 78 in 2000 to 552 in 2011.
- In Nebraska alone, there are over 80 farmers' markets, nearly 290 roadside stands, and approximately 55 U-pick operations.
- Nebraska's produce industry contributes an estimated \$66 million in sales to the state's economy every year.
- Well-established apple orchards across the state attract many loyal customers each fall.
- Pumpkin and berry patches are gaining popularity primarily around the large metropolitan areas of the state.



Sweet clover and alfalfa are two of Nebraska's main sources of nectar for honeybees. Nebraska honey is sought by honey packers all over the world for its delicate flavor and light color. Some of the honey is distributed locally and the rest is sold in bulk to honey producers throughout the nation. While honeybees are kept and admired for the sweet honey they produce, they are of far greater value for pollinating crops. Many beekeepers depend on both pollination bees and honey production for income.





DID YOU KNOW ...?

- Nebraska ranks 13th in the nation in honey production, with over 2 million pounds produced in 2012.
- The state has more than 40,000 bee colonies.
- Large honey producers may have over 1,000 colonies; however, there are also many smaller producers that

make honey for a small business or hobby.

Thousands of honeybees are moved to other states for pollination and then returned to Nebraska for honey season which is considered May through September.





CHRISTMAS TREES

Each Christmas season, millions of trees are purchased from lots and tree farms across the nation. While they're growing, Christmas trees support life by absorbing carbon dioxide and other gases and emitting fresh oxygen. The farms that grow Christmas trees stabilize soil, protect water supplies, and provide refuge for wildlife while creating scenic green belts. The trees are also recyclable and can be used for mulch in gardens and parks or be sunk into lakes to provide habitats and feeding areas for fish after the holiday season.



- There are approximately 22 "choose and harvest" farms in Nebraska. A typical operation is 3 to 8 acres in size.
- The top selling Christmas trees are Balsam Fir, Douglas Fir, Fraser Fir, Noble Fir, Scotch Pine, Virginia Pine and White Pine.
- For every Christmas tree that is harvested, two- to -three seedlings are planted in its place.
- It takes 6 to 12 years to grow a saleable Christmas tree.





THE IMPORTANCE OF AGRICULTURE

Agriculture is the foundation of Nebraska's economy starting with the first days of statehood in the 1860s to the present. While the agriculture industry looks much different today than it did more than 100 years ago, the state's agricultural roots still reach nearly every sector of the economy. From farms and ranches to dinner tables around the world, Nebraska agriculture is many different industries wrapped into one – production, processing, transportation, marketing, research, and more.

As in any industry, agriculture continues to diversify to remain competitive nationally and globally. This begins with research and development – new technology, new crops, and new marketing strategies. Nebraska farmers and ranchers plant herbicide-resistant crops, market identity-preserved commodities, and use satellites and GPS to track crop yields. Nebraska ag producers continue to be leaders in food, fuel, and fiber production, and their commitment to quality is second to none. Food safety and environmental stewardship are top priorities.



A variety of strategies are implemented in marketing Nebraska's agricultural goods. Livestock are primarily sold through local auction markets, direct on-the-farm purchases, private sales, and processor contracting. Grains and other crops have traditionally been sold at harvest to local elevators, which then contract with larger grain trading merchants and international buyers. Storage of grain is an alternative encouraged by the futures market, hedging, options, and other marketing tools.

Nebraska is a local producer, but a world provider, which means the international marketplace plays a role in the state's agricultural marketing efforts. While larger agribusinesses have been selling products on the world market for years now, many individual producers and local elevators are now selling direct to international niche markets. Feed grains and products make up about one-third of Nebraska's ag exports. Livestock and livestock products, such as meat, hides, skins, animal fats, and oils, are also significant exports.

Getting Nebraska's abundant production to domestic and world markets is made possible by a vast transportation infrastructure. Nebraska is served by rail, ground, air, and water transportation, making it possible, and practical, to ship to anywhere in the world.

It's easy to see why Nebraska agriculture is so successful. Production, processing, transportation, marketing, research, and technology all come together to make this industry strong. It is a partnership through and through, enhanced by the work ethic, values and pride all Nebraskans have in the state's agricultural tradition.





Nebraska Department of Agriculture 301 Centennial Mall South Lincoln, NE 68509 (402) 471-2341 www.nda.nebraska.gov

For more information about Nebraska's agricultural industry, please visit www.nda.nebraska.gov/ag_contacts



The Nebraska Department of Agriculture would like to thank USDA, NASS, Nebraska Field Office, along with numerous Nebraska commodity groups and organizations, and several NDA employees for providing input and photographs for this project.